Remarks

The Office Action

The Examiner:

(a) rejects claims 1, 2, 4, 6, 8 and 9 as obvious based on Applicant's own Barth 5269497 in view of US Patent 3248745 to Gunlock and US Patent 6158815 to Sugie et al finding "V" and "W" arches in Gunlock (col. 2, lines 22 – 25) and finding a "cross piece 24" in Sugie spanning "leaf springs 22" and concluding it would be obvious to combine Barth's leaf springs with Gunlock's and Sugie's bent wire springs, to yield the limitations in the claims.

(b) rejects claims 4 and 9 as an obvious design choice;

(c) rejects claims 3, 7, 10, and 11 as above, also considering Isaacs 3173672 as adding a helper spring;

(d) rejects claim 5 as above, again considering Reed 1948130.

Reed and Barth were the only references previously cited.

The Amendment

New claim 12 is added as a third independent claim, and the already present multiple dependency of dependent claims has been amended to include new independent claim 12. Claim 12 is more limited than claim 1, including limitations that narrow things like the geometry of a leaf spring, having top and bottom surfaces and edges, and the location and orientation of the V and W arches. While Applicant believes the limitations of the existing claims, including independent claims 1 and 11, already include language differentiating the V and W arches of leaf springs from the cited art, in the event rods, wires and supports need further differentiation, claim 12 is narrower.

Argument

It is respectfully submitted that the claims are nonobvious and those references would not be combined.

Claims 1, 2, 4, 6, 8 and 9, and New Claim 12

Barth teaches leaf springs with a pair of V arches, the ends of the leaf springs being fixed to the frame. The leaf springs are notably narrower than those taught here, and Barth's preferred embodiment pairs narrow leaf springs.

Gunlock, assigned to General Motors, is for a vehicle seat structure using sinuous wire springs to support the upholstery, and uses bent wire "cantilever support springs" (col. 2, line 13) below the ends, to support the sinuous wire springs above a floor mounted second frame, and noting specific needs to provide support as the border wires are bent.

In an elevational view, like Gunlock's Fig. 2, these vertically supporting wire torsion springs give the illusion of a "V" shape, and in plan view (Fig. 1) they present a rectangular shape. It is true that Gunlock uses the verbiage "generally V shaped supporting member" in the column and lines cited by the Examiner. If the verbiage is what is relied upon, Gunlock never uses language describing a "W" shape and never describes these as arches.

Both functionally, and verbally, these torsion springs are "supporting members" and function very differently from the claimed V and W arches. They have no significant resistance to or accommodation for twist imparted on the seat deck. They only space the seat deck off the floor mounted bottom frame and accommodate sitting weight pressing them down – imparting torsion on the length of wire which appear as "apexes" as shown in elevation. As they are cantilever supporting members, they act in a direction 90° differently than the claimed V and W arches adjacent the ends of flat leaf springs.

Further, the V presented by Gunlock would not be described as anyone as an "arch." Because it is merely an optical illusion in an elevational view (Fig. 2), it is a sharp pointed "V", not an arc-bottomed V or W that meet the "arch" limitation.

The existing limitations in the existing claims place the arches near the ends of leaf springs. Gunlock places "generally V shaped" torsion spring supports under border wire which has wire sinuous springs mounted thereto. Gunlock works differently and is formed for a different purpose than the claimed spring units.

Gunlock teaches away from and does not suggest V or W arches adjacent the ends of flat leaf springs. No one would combine Gunlock with Barth structurally.

Sugie is another patent that teaches a structure adapted to the specific needs of vehicle seating. Sugie more precisely "tunes" the dynamics of the seat to vehicle seating needs, putting coil springs on the sides of a wire, upholstery supporting grid, and specifically noting the need to control for harmonics (col. 3 lines 5 – 51). Sugie also notes the problem of the thin longitudinal wires 22 (col. 4, lines 59 – 60) causing wear and uses " nonwoven fabric 18" bonded on the foam padding, like Gunlock uses fabric on the sinuous wire springs. The differences between wire and leaf springs are well understood by Sugie and Gunlock. They do not have leaf springs and there is no reason one would take their all-wire structures and combine them with the leaf springs of Barth.

The Examiner finds Sugie's "three rods 24 arranged at the two right and left ends and at the center of the thin steel wires 22" (col. 4, lines 61 – 63) to be some sort of equivalents to the claimed "cross piece 24" and "leaf springs 22" (Office Action at page 3, paragraph 3). It is respectfully submitted that no one would find "thin steel wires 22" to be "leaf springs" and no one would find "three rods 24" which are aligned longitudinally against transverse thin wires to be "cross pieces" at the ends of leaf springs.

Indeed, while Gunlock's torsion spring supports, seen in elevational view, are oriented 90° from the claimed V arches and W arches – imagining them rotated about a horizontal, transverse axis – Sugie's coil springs and rods are oriented 90° from the claimed coil springs, leaf springs and cross pieces – imagining them rotated about a vertical axis. And Sugie's detailed discussion of vehicle seat dynamics teaches us that this kind of orientation is very material.

Sugie's detailed concern about the dynamics of the springs in a vehicle, and the placement of the coil springs aligned transversely also teaches away from the claimed coil springs mounted to cross pieces. Sugie's transverse coil springs are mounted to two of the three longitudinal "rods 24." No one would

combine Sugie's car seat wires and rods, and transverse coil springs with Barth to put coil springs at the ends of leaf springs and to have cross pieces interconnect the ends of leaf springs.

Claims 1, 2, 4, 6, 8 and 9 as previously presented are not obvious because neither Gunlock nor Sugie's wire springs teach the claimed elements and no one would combine them. They do not have leaf springs, their wire springs act differently, they are oriented differently, for different purposes, and indeed, they do not literally teach Vs, Ws, cross pieces or spring ends.

Claim 12 is more narrow, having limitations to the geometry of a leaf spring, having top and bottom surfaces and edges, and the location and orientation of the V and W arches.

With respect to the "design choice" rejection of claims 4 and 9, as previously pointed out, the dynamics of seating are deceptively complex. Differing sized and numbers of people sit at differing locations with differing timing parameters and then subjectively react with conclusions of "comfort." Spring structures can yield important functional differences from apparently subtle mechanical variations. The cited art provides examples of very different approaches, because they are for vehicle seats.

Because of the teachings of Gunlock and Sugie, it is now even more clear that the limitations of claims 4 and 9 are material, nonobvious limitations. Gunlock, for example, uses the torsion applied on the wire segment "at" the "apex" (when shown in elevation). Because the supports there are wire, the wire twists when strained. Because Gunlock's supports are "V" in elevation and "rectangular" in plan view, the loads and control of twist are material. Teaching that radii can control twist, where Gunlock uses torsion in wire segments is certainly a discovery. Sugie, teaching the importance of seat dynamics, further emphasizes that the radii can be important, non-obvious, limitations.

Claims 3, 7, 10, and 11

Claims 3, 7 and 10 are dependent claims, and independent claim 11 and independent claim, which include *inter alia* helper springs limitations. The claimed helper springs are mounted at the ends of the claimed leaf springs. The Examiner finds Isaacs' "generally S-shaped support spring strip 22 (see FIG. 2)" (col. 2, line 12) to be the claimed helper spring.

The specification in the present application teaches helper spring 70 and shows, in Figure 5, its location, as claimed, at the end of the leaf spring. Throughout, primary support for the spring unit relative to the frame is by a plurality of coil springs, acting on the cross piece, to which the leaf springs are attached. Secondary "helper" function is performed and claimed in claims 3, 8 and 10.

Isaacs is, first of all, not for a seat base or bottom at all, but is for a seat back. As such, it is subject to much different loads and is not likely to be combined with the spring structure on which an occupant sits and which must hold up the occupant's weight. Isaac has, at the end of the leaf springs, "generally S-shaped support spring strip[s] 22". At Isaacs' seat back top corners are transverse coil springs 38. The entire structure, however, has different loading, orientation and geometric characteristics. For there to be something similar to the claimed combination, for example, the coil springs would need to extend vertically upwardly and attach to the very top of the seat back, and the structure hang down. It would similarly make no sense to need helper springs under a low load. The occupant's weight is not borne by Isaacs, the occupant just leans on Isaacs' seat back.

Further, it makes no sense for "support spring strip[s]" to be considered secondary or "helper" springs. If anything is secondary, or "helper" then it would be the top corner coil springs, but these do not attach in the manner as claimed. Isaacs is not combinable with Barth, Gunlock and Sugie.

The additional arguments distinguishing the previous claims from Barth plus Gunlock and Sugie are incorporated by reference.

As previously pointed out, the arguments above also apply to the rejection of claim 5. Reed uses horizontally oriented coil springs, interconnecting vertically oriented coil springs. Reed includes structure between selected vertical coil spring arrays that angled spring bars 32 and have additional coil springs connected to other coil springs. Reed, however, does not teach the structure which would be combined with the other references. Reed puts its third set of coil springs directly on the ends of springs 32 and those bear on and would urge separation of the coils in vertical coil springs. Claim 5 calls for the frame to define the dropped center portion, not just for a dropped center portion to be present. If Reed sags, it will be because the vertical coil springs sag. Reed has rigid border wire all around.

Conclusion

It is respectfully submitted that the cited art neither teaches the claimed limitations nor would the cited art be combined with Barth's leaf spring seat unit. This amendment is considered to be responsive to all points raised in the office action. Should the examiner have any remaining questions or concerns, the examiner is encouraged to contact the undersigned attorney by telephone to expeditiously resolve such concerns.

Respectfully Submitted,

David C. Brezina

Dated: April 5, 2010

Attorney for Applicant
David C. Brezina, Reg. No. 34,128
Ladas & Parry, LLP
224 South Michigan Avenue
Suite 1600
Chicago, IL 60604
312-427-1300